WHAT IS CLAIMED IS:

1. A multi-beam scanning optical system comprising incidence optical means for guiding a plurality of beams emitted from light source means having a plurality of light-emitting regions spaced apart from each other in a main scanning direction, to deflecting means; scanning optical means for focusing the plurality of beams deflected by the deflecting means, on a surface to be scanned, to form a plurality of scan lines; and synchronism-detecting optical means for converging part of the plurality of beams deflected by the deflecting means, on a slit surface by a lens section, thereafter guiding the beams to a synchronism detector, and controlling timing of a scan start position on the surface to be scanned for each of the plurality of beams by use of a signal from the synchronism detector,

wherein the following condition is satisfied:

$$|\delta M1| \leq \delta Ymax/\tan(\theta max)$$

(where

$\delta M1$: defocus amount in a main scanning section of the beams guided to the synchronism detector and in a view from the slit;

$\delta Ymax$: permissible dot shift amount per scan line;

θmax: maximum angle difference between angles of incidence to the slit surface of the beams used for detection of synchronism).

2. The multi-beam scanning optical system according to Claim 1, wherein said permissible dot shift amount per scan line is not more than half of resolution in a sub-scanning direction.

3. The multi-beam scanning optical system according to Claim 1, comprising correction means for relatively shifting a focus position in the main scanning section of the beams guided to said synchronism detector in a direction of the optical axis of said synchronism-detecting optical means from said slit surface.

4. The multi-beam scanning optical system according to Claim 1, comprising correction means for moving the position of said slit surface or a unit including the slit surface in a direction of the optical axis of said synchronism-detecting optical means.

5. The multi-beam scanning optical system according to Claim 1, wherein said lens section is disposed in an optical path between said deflecting means and said slit surface, said optical system comprising correction means for moving said lens section in a direction of the optical axis of said synchronism-detecting optical means.

6. The multi-beam scanning optical system according to Claim 1, wherein at least one lens forming said lens section is integrated with said scanning optical means, said optical system comprising correction means for moving at least one lens of the lens section not integrated with the scanning optical means, and said slit surface in a direction of the optical axis of said synchronism-detecting optical means.

7. The multi-beam scanning optical system according to Claim 1, wherein said lens section is integrated with said scanning optical means, said optical system comprising correction means for moving at least one optical element of the scanning optical means in a direction of the optical axis of the scanning optical means and for moving said slit surface in a direction of the optical axis of said synchronism-detecting optical means.

8. The multi-beam scanning optical system according to Claim 1, wherein at least one lens forming said lens section is integrated with said scanning optical means, said optical system comprising correction means for moving at least one lens forming the scanning optical means in the main scanning direction.

9. A multi-beam scanning optical system comprising incidence optical means for guiding a plurality of beams emitted from light source means having a plurality of light-emitting regions spaced apart from each other in a main scanning direction, to deflecting means; scanning optical means for focusing the plurality of beams deflected by the deflecting means, on a surface to be scanned, to form a plurality of scan lines; and synchronism-detecting optical means for converging part of the plurality of beams deflected by the deflecting means, on a slit surface by a lens section, thereafter guiding the beams to a synchronism detector, and controlling timing of a scan start position on the surface to be scanned for each of the plurality of beams by use of a signal from the synchronism detector,

said multi-beam scanning optical system comprising correction means for correcting a dot shift per scan line on the surface to be scanned, which occurs because of a defocus amount $\delta M1$ in a main scanning section of the beams guided to the synchronism detector and in a view from the slit surface.

10. The multi-beam scanning optical system according to Claim 9, wherein said dot shift is not more than half of resolution in a sub-scanning direction.

11. The multi-beam scanning optical system according to Claim 9, wherein said plurality of light-emitting regions are spaced apart from each other in the main scanning direction and in the sub-scanning direction.

12. The multi-beam scanning optical system according to Claim 11, wherein a slit in said slit surface is inclined in the sub-scanning direction according to the dot shift per scan line on said surface to be scanned.

13. The multi-beam scanning optical system according to Claim 11, comprising rotating means for rotating said slit surface or a unit including the slit surface about the optical axis of the synchronism-detecting optical means according to the dot shift per scan line on said surface to be scanned.

14. A multi-beam scanning optical system comprising incidence optical means for guiding a plurality of beams emitted from light source means having a plurality of light-emitting regions spaced apart from each other in a main scanning direction, to deflecting means; scanning optical means for focusing the plurality of beams deflected by the deflecting means on a surface to be scanned, to form a plurality

of scan lines; and synchronism-detecting optical means for guiding part of the plurality of beams deflected by the deflecting means, to a synchronism detector by a lens section and controlling timing of a scan start position on the surface to be scanned for each of the plurality of beams by use of a signal from the synchronism detector,

wherein the following condition is satisfied:

$$|\delta M2| \leq \delta Ymax/\tan(\theta max)$$

(where

$\delta M2$: defocus amount in a main scanning section of the beams guided to the synchronism detector and in a view from a photoreceptive surface of the synchronism detector;

$\delta Ymax$: permissible dot shift amount per scan line;

θmax: maximum angle difference between angles of incidence to the photoreceptive surface of the beams used for detection of synchronism).

15. The multi-beam scanning optical system according to Claim 14, wherein said permissible dot shift amount per scan line is not more than half of resolution in a sub-scanning direction.

16. The multi-beam scanning optical system according to Claim 14, comprising correction means for relatively shifting a focus position in the main

scanning section of the beams guided to said synchronism detector in a direction of the optical axis of said synchronism-detecting optical means from the photoreceptive surface of the synchronism detector.

17. The multi-beam scanning optical system according to Claim 14, comprising correction means for moving the position of said synchronism detector or a unit including the synchronism detector in a direction of the optical axis of said synchronism-detecting optical means.

18. The multi-beam scanning optical system according to Claim 14, wherein said lens section is disposed in an optical path between said deflecting means and said synchronism detector, said optical system comprising correction means for moving said lens section in a direction of the optical axis of said synchronism-detecting optical means.

19. The multi-beam scanning optical system according to Claim 14, wherein at least one lens forming said lens section is integrated with said scanning optical means, said optical system comprising correction means for moving at least one lens of the lens section not integrated with the scanning optical means, and said synchronism detector in a direction of

the optical axis of said synchronism-detecting optical means.

20. The multi-beam scanning optical system according to Claim 14, wherein said lens section is integrated with said scanning optical means, said optical system comprising correction means for moving at least one optical element of the scanning optical means in a direction of the optical axis of the scanning optical means and for moving said synchronism detector in a direction of the optical axis of said synchronism-detecting optical means.

21. The multi-beam scanning optical system according to Claim 14, wherein at least one lens forming said lens section is integrated with said scanning optical means, said optical system comprising correction means for moving at least one lens forming the scanning optical means in the main scanning direction.

22. A multi-beam scanning optical system comprising incidence optical means for guiding a plurality of beams emitted from light source means having a plurality of light-emitting regions spaced apart from each other in a main scanning direction, to deflecting means; scanning optical means for focusing

the plurality of beams deflected by the deflecting means, on a surface to be scanned; and synchronism-detecting optical means for converging part of the plurality of beams deflected by the deflecting means, on a slit surface by a lens section, thereafter guiding the beams to a synchronism detector, and controlling timing of a scan start position on the surface to be scanned by use of a signal from the synchronism detector,

wherein, where $\delta M1$ is a defocus amount in a main scanning section of the beams guided to the synchronism detector and in a view from the slit surface and δX is a defocus amount at each image height on the surface to be scanned, the following condition is satisfied:

$$|\delta X - \delta M1| \leq \delta Ymax/\theta max$$

(where

$\delta Ymax$: permissible dot shift amount per scan line;

θmax: maximum angle difference between angles of incidence to the slit surface of the beams used for detection of synchronism).

23. The multi-beam scanning optical system according to Claim 22, wherein said permissible dot shift amount per scan line is not more than half of resolution in a sub-scanning direction.

24. The multi-beam scanning optical system

according to Claim 22, comprising correction means for relatively shifting a focus position in the main scanning section of the beams guided to said synchronism detector in a direction of the optical axis of said synchronism-detecting optical means from said slit surface.

25. The multi-beam scanning optical system according to Claim 22, comprising correction means for moving the position of said slit surface or a unit including the slit surface in a direction of the optical axis of said synchronism-detecting optical means.

26. The multi-beam scanning optical system according to Claim 22, wherein said lens section is disposed in an optical path between said deflecting means and said slit surface, said optical system comprising correction means for moving said lens section in a direction of the optical axis of said synchronism-detecting optical means.

27. A multi-beam scanning optical system comprising incidence optical means for guiding a plurality of beams emitted from light source means having a plurality of light-emitting regions spaced apart from each other in a main scanning direction, to

deflecting means; scanning optical means for focusing the plurality of beams deflected by the deflecting means, on a surface to be scanned, to form a plurality of scan lines; and synchronism-detecting optical means for converging part of the plurality of beams deflected by the deflecting means, on a slit surface by a lens section, thereafter guiding the beams to a synchronism detector, and controlling timing of a scan start position on the surface to be scanned for each of the plurality of beams by use of a signal from the synchronism detector;

where $\delta M1$ is a defocus amount in a main scanning section of the beams guided to the synchronism detector and in a view from the slit surface and δX is a defocus amount at each image height on the surface to be scanned, said multi-beam scanning optical system comprising correction means for correcting a dot shift per scan line on the surface to be scanned, which occurs because of a difference between the two defocus amounts $\delta M1$, δX.

28. The multi-beam scanning optical system according to Claim 27, wherein said dot shift is not more than half of resolution in a sub-scanning direction.

29. The multi-beam scanning optical system

according to Claim 27, wherein said plurality of light-emitting regions are spaced apart from each other in the main scanning direction and in the sub-scanning direction.

30. The multi-beam scanning optical system according to Claim 29, wherein a slit in said slit surface is inclined in the sub-scanning direction according to the dot shift per scan line on said surface to be scanned.

31. The multi-beam scanning optical system according to Claim 29, comprising rotating means for rotating said slit surface or a unit including the slit surface about the optical axis of the synchronism-detecting optical means according to the dot shift per scan line on said surface to be scanned.

32. A multi-beam scanning optical system comprising incidence optical means for guiding a plurality of beams emitted from light source means having a plurality of light-emitting regions spaced apart from each other in a main scanning direction, to deflecting means; scanning optical means for focusing the plurality of beams deflected by the deflecting means on a surface to be scanned; and synchronism-detecting optical means for guiding part of the

plurality of beams deflected by the deflecting means, to a synchronism detector by a lens section and controlling timing of a scan start position on the surface to be scanned by use of a signal from the synchronism detector,

wherein, where $\delta M2$ is a defocus amount in a main scanning section of the beams guided to the synchronism detector and in a view from a photoreceptive surface of said synchronism detector and δX is a defocus amount at each image height on the surface to be scanned, the following condition is satisfied:

$$|\delta X - \delta M2| \leq \delta Ymax/\theta max$$

(where

$\delta Ymax$: permissible dot shift amount per scan line;

θmax: maximum angle difference between angles of incidence to the photoreceptive surface of the beams used for detection of synchronism).

33. The multi-beam scanning optical system according to Claim 32, wherein said permissible dot shift amount per scan line is not more than half of resolution in a sub-scanning direction.

34. The multi-beam scanning optical system according to Claim 32, comprising correction means for relatively shifting a focus position in the main scanning direction of the beams guided to said

synchronism detector in a direction of the optical axis of said synchronism-detecting optical means from the photoreceptive surface of the synchronism detector.

35. The multi-beam scanning optical system according to Claim 32, comprising correction means for moving the position of said synchronism detector or a unit including the synchronism detector in a direction of the optical axis of said synchronism-detecting optical means.

36. The multi-beam scanning optical system according to Claim 32, wherein said lens section is disposed in an optical path between said deflecting means and said synchronism detector, said optical system comprising correction means for moving said lens section in a direction of the optical axis of said synchronism-detecting optical means.

37. An image forming apparatus comprising the multi-beam scanning optical system as set forth in either one of Claims 1 to 36; a photosensitive member placed on said surface to be scanned; a developing unit for developing an electrostatic latent image formed on said photosensitive member with scanning light by said multi-beam scanning optical system, into a toner image; a transfer unit for transferring said developed toner

image onto a transfer medium; and a fixing unit for fixing the transferred toner image on the transfer medium.

38. An image forming apparatus comprising the multi-beam scanning optical system as set forth in either one of Claims 1 to 37; and a printer controller for converting code data supplied from an external device, into an image signal and entering the image signal into said multi-beam scanning optical system.

39. A multi-beam scanning optical system comprising incidence optical means for guiding a plurality of beams emitted from light source means having a plurality of light-emitting regions spaced apart from each other in a main scanning direction, to deflecting means; scanning optical means for focusing the plurality of beams deflected by the deflecting means, on a surface to be scanned, to form a plurality of scan lines; and synchronism-detecting optical means for converging part of the plurality of beams deflected by the deflecting means, on a slit surface by a lens section, thereafter guiding the beams to a synchronism detector, and controlling timing of a scan start position on the surface to be scanned for each of the plurality of beams by use of a signal from the synchronism detector,

wherein a dot shift per scan line on the surface to be scanned, which occurs because of a defocus amount δM1 in a main scanning section of the beams guided to said synchronism detector and in a view from said slit surface, is not more than half of resolution in a sub-scanning direction.

40. A multi-beam scanning optical system comprising incidence optical means for guiding a plurality of beams emitted from light source means having a plurality of light-emitting regions spaced apart from each other in a main scanning direction, to deflecting means; scanning optical means for focusing the plurality of beams deflected by the deflecting means, on a surface to be scanned, to form a plurality of scan lines; and synchronism-detecting optical means for guiding part of the plurality of beams deflected by the deflecting means, to a synchronism detector by a lens section and controlling timing of a scan start position on the surface to be scanned for each of the plurality of beams by use of a signal from the synchronism detector,

wherein a dot shift per scan line on the surface to be scanned, which occurs because of a defocus amount δM2 in a main scanning section of the beams guided to said synchronism detector and in a view from a photoreceptive surface of said synchronism detector, is

not more than half of resolution in a sub-scanning direction.

41. A multi-beam scanning optical system comprising incidence optical means for guiding a plurality of beams emitted from light source means having a plurality of light-emitting regions spaced apart from each other in a main scanning direction, to deflecting means; scanning optical means for focusing the plurality of beams deflected by the deflecting means, on a surface to be scanned, to form a plurality of scan lines; and synchronism-detecting optical means for converging part of the plurality of beams deflected by the deflecting means, on a slit surface by a lens section, thereafter guiding the beams to a synchronism detector, and controlling timing of a scan start position on the surface to be scanned for each of the plurality of beams by use of a signal from the synchronism detector,

wherein, where $\delta M1$ is a defocus amount in a main scanning section of the beams guided to said synchronism detector and in a view from said slit surface and δX is a defocus amount at each image height on said surface to be scanned, a dot shift per scan line on the surface to be scanned, which occurs because of a difference between the two defocus amounts $\delta M1$, δX, is not more than half of resolution in a sub-

scanning direction.

42. A multi-beam scanning optical system comprising incidence optical means for guiding a plurality of beams emitted from light source means having a plurality of light-emitting regions spaced apart from each other in a main scanning direction, to deflecting means; scanning optical means for focusing the plurality of beams deflected by the deflecting means, on a surface to be scanned, to form a plurality of scan lines; and synchronism-detecting optical means for guiding part of the plurality of beams deflected by the deflecting means to a synchronism detector by a lens section and controlling timing of a scan start position on the surface to be scanned for each of the plurality of beams by use of a signal from the synchronism detector,

wherein, where $\delta M2$ is a defocus amount in a main scanning section of the beams guided to said synchronism detector and in a view from a photoreceptive surface of said synchronism detector and δX is a defocus amount at each image height on said surface to be scanned, a dot shift per scan line on the surface to be scanned, which occurs because of a difference between the two defocus amounts $\delta M2$, δX, is not more than half of resolution in a sub-scanning direction.